

Vitamins and aminoacids regulate stem cell biology

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Credit: National Research Council of Italy

An International Reserach Team coordinated by Igb-Cnr has discovered a key role of vitamins and amino acids in pluripotent stem cells. The research is published in *Stem Cell Reports*, and may provide new insights in cancer biology and regenerative medicine

Vitamins and [amino acids](#) play a key role in the regulation of epigenetic modifications involved in the progression of diseases such as cancer. The research may have future implications in [cancer biology](#). The study was published in *Stem Cell Reports*.

"We found that two metabolites, vitamin C and the amino acid L-Proline, are important players in the control of stem cell behaviour. This study shows that pluripotent embryonic stem cells present in the earliest phases of development are pushed toward a more immature 'naive' state by vitamin C, while they are forced to acquire a 'primed' state in the presence of L-Proline. Thus, vitamin C and L-Proline exert opposite effects on embryonic stem cells, and this correlates with their ability to modify DNA (DNA methylation) without altering the sequence, but instead, the regulation of gene expression," explained researcher Gabriella Minchiotti.

Stem cells possess the unique ability to self-renew and differentiate into other cell types, which makes them extremely interesting in medical and biological research. "Embryonic stem cells are the most 'potent' (defined as pluripotent), meaning that they can give rise to all cell types of an organism, such as cardiomyocytes, neurons, bones, etc. Like normal stem cells, cancer stem cells can also self-renew and differentiate, and are believed to be responsible for tumor growth and therapy resistance."

This study provides an important contribution to the understanding of how metabolites regulate pluripotency and shape the epigenome in [embryonic stem cells](#), which have been largely unexplored and recently gained great interest. This knowledge not only enhances our understanding of the biology of normal [stem cells](#) but may offer novel insights into [cancer stem cell](#) biology, identifying novel potential therapeutic targets.

More information: *Stem Cell Reports*,

[dx.doi.org/10.1016/j.stemcr.2016.11.011](https://doi.org/10.1016/j.stemcr.2016.11.011)

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